Srijon Sadhukhan (29)
XI-B

KENDRIYA VIDYALAYA SANGATHAN MUMBAI REGION

SESSION ENDING EXAMINATION (2017-18)

CLASS : XI **SUBJECT : MATHEMATICS**

TIME : 3 Hrs **MAX. MARKS : 100**

GENERAL INSTRUCTIONS :-

This question paper contains 3 pages

1) All Questions are compulsory.
2) The Question paper contains 29 questions which is divided into 4 sections A, B, C and D.
3) Section A comprises of 4 questions of 1 mark each, Section B comprises of 8 questions of 2 marks each, Section C comprises of 11 questions of 4 marks each and Section D comprises of 6 questions of 6 marks each.
4) There is no overall choice. However Internal choice has been provided with 3 questions in Section B and 2 questions in Section C.
5) Use of calculator is not permitted.

SECTION – A

01. If a function f: R →R is defined by $f(x) = x^2+1$ then find the image of 17.

02. Find a and b such that 2a + i4b and 2i represent same complex number.

03. Find the length of the median AD of the triangle ABC with vertices A(0, 0, 2), B(0, 4, 0) and C(8, 0, 0).

04. Write the converse of the statement " If you are born in India then you are a citizen of India"

SECTION - B

05. Let A, B and C be any three sets such that $A \cup B = C$ and $A \cap B = \phi$. Then prove that A = C – B.

06. If A = {1, 2, 3, 4, 5}, B = {1, 3, 5, 8} and C = { 2, 5, 7, 8} Verify that $A-(B \cup C) = (A-B) \cap (A-C)$

07. How many words can be formed with the letters of the word 'ORDINATE' so that vowels occupy odd places?

08. Find the 4^{th} term in the expansion of $(x-2y)^{12}$

09. A point R with x-coordinate 4 lies on the line segment joining the points P(2, -3, 4) and Q(8, 0, 10). Find the co-ordinates of the point R.

10. Evaluate: $\lim_{x \to 2} \frac{3x^2-x-10}{x^2-4}$

11. Show that the following statement is true by the method of contra-positive
P: If x is an integer and x^2 is even then x is also even.

12. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and the probability that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that only one of them will qualify the examination.

SECTION - C

13. Let f : R →R be a function defined by f(x) = $\frac{x^2}{1+x^2}$. Find the Domain and Range of f.

14. Prove that $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$

15. Find the general solutions of cot x + tan x = 2 cosec x

(OR)

Solve: $\sqrt{3}\cos\theta + \sin\theta = \sqrt{2}$

16. Convert $\left(\frac{1+i}{1-i} - \frac{1-i}{1+i}\right)$ into polar form

17. How many words with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE?

18. The coefficients of the $(r-1)^{th}$, r^{th} and $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1 : 3 : 5. Find n and r.

19. If the arithmetic mean between a and b is twice as the geometric mean between a and b, show that the numbers are in the ratio $(2+\sqrt{3}):(2-\sqrt{3})$

(OR)

The sum of three numbers in GP is 56. If we subtract 1, 7, 21 from these numbers in that order, we obtain an AP. Find these numbers.

20. Find the sum of the series $1.2^2 + 3.3^2 + 5.4^2 + 7.5^2 + \ldots$ n terms

21. Find the equation of the hyperbola with foci $(0,\pm 3)$ and vertices $(0,\pm\frac{\sqrt{11}}{2})$

22. (i) Find the derivative of the function f(x) = $\frac{2x+3}{x-2}$ from the first principle

(ii) Find the derivative of the function f(x) = $x^5(3-6x^{-9})$

(OR)

Evaluate $Lt_{x\to 0}\dfrac{\tan x-\sin x}{x^3}$

23. A box contains 10 red marbles, 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box, What is the probability that

a) All will be blue? b) atleast one will be blue?

SECTION - D

24. In a survey of 100 students, the number of students playing various games were found to be as follows:-

Cricket only 18 ; Cricket but not Football 23 ; Cricket and Badminton 8 ; Cricket 26; Badminton 48 ; Badminton and Football 8 and no games 24

a) How many students were playing Football?

b) How many students were playing Cricket and Football?

c) Write the Importance of sports in student daily life.

25. Prove that $\tan(A+30^\circ)+\cot(A-30^\circ)=\dfrac{1}{\sin 2A-\sin 60}$

(OR)

Prove that $(\cos\alpha-\cos\beta)^2+(\sin\alpha+\sin\beta)^2=4\sin^2\dfrac{\alpha-\beta}{2}$

26. Prove that $2.7^n+3.5^n-5$ is divisible by 24 using Principle of mathematical induction.

27. Solve the Inequations graphically:-

$x+2y\le 10; x+y\ge 1; x-y\le 0, x\ge 0; y\ge 0$

28. Find the image of the point (1, -2) with respect to the line mirror $2x-y+1=0$

(OR)

Find the equation of the line passing through the point of intersection of the lines $4x+7y-3=0$ and $2x-3y+1=0$ that has equal intercepts on the axes.

29. Find the mean and variance of the following data

Marks	10-20	20-30	30-40	40-50	50-60	60-70	70-80
frequency	9	17	32	33	40	10	9

****